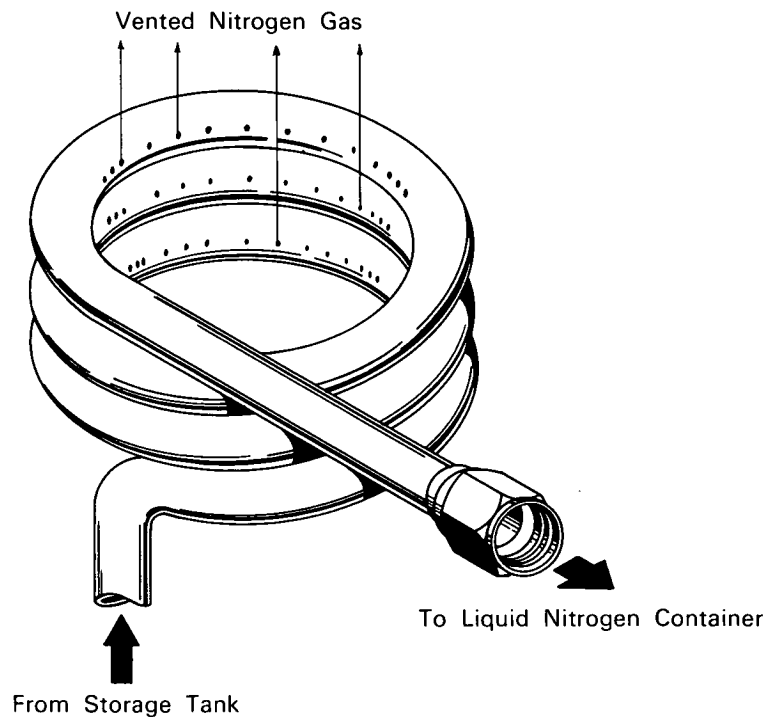


# NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

## Helical Tube Separates Nitrogen Gas from Liquid Nitrogen



**The problem:** In filling a container with liquid nitrogen from a storage tank, small quantities of nitrogen gas ordinarily carried over into the container present a boiloff problem.

**The solution:** A section of perforated helical tubing, in which the fluid mixture flowing from the storage tank to the container is separated into liquid and gaseous components by centrifugal and venting action.

**How it's done:** A section of aluminum tubing is bent into a helix of three or more turns. Small

holes are drilled through the wall of the tubing on the inside of the helix, as shown in the illustration. In use, one end of the tubing is connected to the liquid nitrogen storage tank and the other end is connected to the container. As the fluid circulates in the helical tubing, the relatively dense liquid nitrogen is centrifugally thrown toward the outer circumference of the helix while the lighter nitrogen gas is confined to the inner path and escapes through the perforations into the surrounding atmosphere. The liquid nitrogen, thus freed of the gaseous phase, continues through the straight portion of the tubing to the container.

(continued overleaf)

**Notes:**

1. This method should be useful for separation of other cryogenic liquid-gas mixtures.
2. For further information about this innovation inquiries may be directed to:

Technology Utilization Officer  
Jet Propulsion Laboratory  
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Pasadena, California 91103  
Reference: B63-10251

**Patent status:** NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: James B. Stephens  
(JPL-398)